REMARKS/ARGUMENTS

Claims 17-32 are pending.

Claims 17-32 are rejected.

The independent claims are 17 (apparatus), 20 (method), 23 (apparatus).

Claim Rejections

2. Claims 17, 23-25, and 28-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Auxerre (US 6,463,975).

As best depicted in Figure 3, Auxerre is directed to a pneumatic tire construction having a tread 4 (as depicted in Figure 1), a pair of sidewalls 5, a pair of bead regions, each having an inextensible annular bead core 11, one or more carcass plies 2 in each bead region, and an elastomeric element or filler 73 disposed adjacent each bead core. The carcass structure of this tire passes under the radially inner portion of said bead core, is wrapped around said elastomeric element, and terminates at a position inward of the bead core and anchored between the bead core and the carcass ply.

It is noted that while claim 23 contains the language "axially inward of the respective bead core", it is believed that applicant intended the tire to require the elastomeric element be axially outward of the respective bead core. This description is consistent with applicant's original disclosure, as evidenced by Figures 2 and 3, Page 2, Lines 14-18, and the language of dependent claims 24-32. As such, the claims have been treated as requiring an axially outward positioning for the elastomeric elements.

With respect to claims 24 and 25, the claimed geometry is depicted by Auxerre in Figure 3.

Regarding claims 28-32, Figure 3 of Auxerre clearly depicts the claimed arrangement of the carcass turnup portion in relation to the bead core and the elastomeric element or filler.

3. Claims 23-25 and 28-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasuda (JP 2-293207).

As best depicted in Figure 1, Yasuda is directed to a pneumatic tire construction having a tread 12, two bead regions 16, two bead cores 24, a reinforcing ply 18, and two elastomeric elements (one in each sidewall) 30, wherein the turnup 20 of said reinforcing ply wraps around the

bead core. Also, as noted in the previous paragraph, it appears that applicant intended the elastomeric elements to be positioned axially outward of the respective bead cores- this configuration is depicted in Figure 1 of Yasuda.

Regarding claims 24 and 25, the claimed geometry is depicted by Yasuda in Figure 1.

With respect to claims 28-31, Figure 1 of Yasuda clearly depicts the claimed arrangement of the carcass turnup portion in relation to the bead core and the elastomeric element or filler.

5. Claims 18 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre.

As detailed above, Auxerre discloses a tire construction in which a carcass turnup portion surrounds an axially outward positioned elastomeric element (in relation to the bead core). Although Auxerre fails to describe the elastomeric elements as being arranged in a pre-cured state, it is extremely well known in the tire industry to apply various tire components to a building drum in either a green (uncured) or cured condition. Absent any conclusive showing of unexpected results, one of ordinary skill in the art at the time of the invention would have found it obvious to select either of the well known and extensively used techniques, it being noted that the components must be applied in the one of the two aforementioned conditions.

6. Claims 19 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre and further in view of Causa (US 5,513,683).

In describing the elastomeric element or filler 73, Auxerre is completely silent as to the inclusion of reinforcing fibers. However, one of ordinary skill in the art at the time of the invention would have found it obvious to include reinforcing fibers in the filler of Auxerre since it is extremely well known to include such fibers in a variety of tire rubber components, including fillers, in order to enhance the reinforcement of a given tire component, as shown for example by Causa (Column 1, Lines 5-32). It is particularly noted that Causa discloses each of the claimed fibers as providing suitable reinforcing characteristics. As such, the inclusion of fibers in the elastomeric filler of Auxerre would have readily appreciated by one of ordinary skill in the art at the time of the invention. It is further noted that applicant has not provided a conclusive showing of unexpected results to establish a criticality for the use of reinforcing fibers.

7. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre

and further in view of Travers (US 3,301 ,303).

Auxerre teaches the pneumatic tire construction of the claimed invention as defined in independent claim 1. In describing the tire making process, Auxerre only states that bead reinforcement layers are laid on a building drum, as is common in the tire industry (Column 5, Lines 30-35). While the reference is completely silent as to the method steps involved in forming such a tire, one of ordinary skill in the art at the time of the invention would have found the claimed steps obvious since they are consistent with the techniques commonly employed in similar tire constructions. For example, Travers is directed to an extremely similar tire construction and formed by the following steps: the carcass is laid over a building drum, a first bead element is positioned over the carcass, the carcass is turned up and folded inwardly over said bead element, and a second bead element is disposed inwardly of said first bead element (Column 2, Lines 63-72). This is analogous to the claimed method and represents the common manner in which locked or anchored carcass turnup structures are manufactured. Also, while not expressly described, it is readily apparent that the tire would be subsequently expanded and inflated.

As to claim 22, it is unclear if the claim positively requires a chafer and "other tire components". In any event, the claimed sequence of adding tire components after expansion of the building drum is well known and extensively used in the tire industry, there being no conclusive showing of unexpected results to establish a criticality for adding the components after expansion. Thus, it would have been obvious to incorporate the well-known method identified above in the process of Auxerre. Furthermore, the tire of Auxerre does contain an additional rubber component disposed axially outward of the elastomeric element that can be viewed as a chafer.

8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre and Travers as applied in claim 20 above and further in view of Winstanley (US 3,654,007).

As noted above, Auxerre suggests a method in which the respective components are laid on a building drum. While Auxerre is silent as to the construction of the building drum, one of ordinary skill in the art at the time of the invention would have found it obvious to include a groove or recess in the building drum in order to ensure accurate positioning of the bead components, as shown for example by Winstanley (Figure 1 and Column 2, lines 40-70). It is emphasized that building drums used in the tire industry are commonly employed with a recess or groove for the benefits noted

above and as such, one of ordinary skill in the art at the time of the invention would have readily appreciated such a construction in the method of Auxerre.

9. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda.

As detailed above, Yasuda discloses a tire construction in which a carcass turnup portion surrounds an axially outward positioned elastomeric element (in relation to the bead core). Although Yasuda fails to describe the elastomeric elements as being arranged in a pre-cured state, it is extremely well known in the tire industry to apply various tire components to a building drum in either a green (uncured) or cured condition. Absent any conclusive showing of unexpected results, one of ordinary skill in the art at the time of the invention would have found it obvious to select either of the well known and extensively used techniques, it being noted that the components must be applied in the one of the two aforementioned conditions.

10. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda and further in view of Causa.

As detailed above, Yasuda discloses a tire construction in which a carcass turnup portion surrounds an axially outward positioned elastomeric element (in relation to the bead core). In describing the elastomeric element or filler, Yasuda is completely silent as to the inclusion of reinforcing fibers. However, one of ordinary skill in the art at the time of the invention would have found it obvious to include reinforcing fibers in the filler of Yasuda since it is extremely well known to include such fibers in a variety of tire rubber components, including fillers, in order to enhance the reinforcement of a given tire component, as shown for example (Column 1, Lines 5-32). It is particularly noted that Causa discloses each of the claimed fibers as providing suitable reinforcing characteristics. As such, the inclusion of fibers in the elastomeric filler of Yasuda would have readily appreciated by one of ordinary skill I the art at the time of the invention. It is further noted that applicant has not provided a conclusive showing of unexpected results to establish a criticality for the use of reinforcing fibers.

The Invention, Generally

The present invention relates to a pneumatic tire, specifically to the carcass ply turnup structure in the bead region and more specifically to a locked bead type of construction. The bead

regions each comprise an inextensible annular bead core in a side-by-side relationship with a coaxial elastomeric torus, the torus placed outwardly adjacent to each bead core relative to the equatorial plane of the tire. The carcass plies within each bead region extend radially inward from the sidewalls and proceed inward of the bead core relative to the equatorial plane of the tire. The carcass plies are then wrapping around and radially outward of the elastomeric torus with the locked edge of the carcass plies located back under and radially inward of the bead core.

A preferred embodiment of a tire construction is shown and described with respect to FIGUREs 2 and 3.

The bead regions **238a,238b** comprise an inextensible bead core **244a** and **244b**, respectively, and an elastomeric torus or ring **246a** and **246b**, respectively. Each elastomeric torus **246a,246b** is located laterally outward from and adjacent to the bead cores **244a,244b**, respectively, relative to the equatorial plane **EP** of the tire **230**. The elastomeric torus **246a,246b** is preferably constructed of a pre-cured or partially cured rubber so that the torus can be easily handled and will maintain its shape during the initial manufacturing stages. The toruses **246a,246b** can be reinforced by fibers of materials including glass, aramid, steel and polyester. Preferred section diameter of torus 246a, 246b is 5mm to 8 mm which is compatible with the carcass ply flexiblity. While the toruses are shown with a circular cross section, it is within the scope of the invention to provide a torus with other geometrical cross sections, such as but not limited to square, oblong, triangular and octaganol.

Referring to **FIGURE 3**, a detail the bead region **238b** of the tire **230** mounted on a tire rim **358** is illustrated. Bead region **238a** is a mirror image of bead region **238b** and therefore not discussed. As shown in **FIGURE 3**, ply **242** extends down sidewall **236b** and includes a turnup end **242b** that initially wraps around and under bead core **244b**. Turnup end **242b** then extends laterally outward under the bead core **244b** relative to the equitorial plane of the tire **230**, under the elastomeric torus **246b** and is then turned up and around the elastomeric torus **246b**. Continuing, the turnup end **242b** is folded back under the bead core **244b** so that the locked end section **250b** of the carcass ply turnup end **242b** is located radially inward of the bead core **244b** and anchored between the bead core and the initial turn of the carcass ply end **242b** where it extends laterally outward from the central portion of ply **242** and around and under the bead core **244b**. Note that the locked end sections **250a,250b** can wrap around the bead cores **244a,244b** and extend upward adjacent against the central portion of the ply **242**.

FIGURES 4A, 4B and **4C**, illustrate several steps in the process of forming the bead regions **238a,238b** using a substantially conventional tire building drum.

The application contains both apparatus and method claims, all of which are currently rejected.

Arguments Traversing the Rejections

The Apparatus Claims

2. Claims **17**, **23**-25, and 28-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Auxerre (US 6,463,975).

Auxerre (US 6,463,975) discloses tire with at least two anchoring bead wires and at least one ply of circumferential reinforcement elements in each bead. As noted in Auxerre, the bead B of the tire of dimension 205/75 R17.5, which is in accordance with the invention and is shown in FIG. 2, is reinforced by two bead wires 11 and 12, each of said bead wires having rectangular cords, that is to say, formed by winding a cord of rectangular section on a suitable form until a plurality of radially juxtaposed rows of cords is obtained, being coated in a rubber mix 110, 120 of a high modulus of elongation." (Column 6, lines 28-35).

As further noted in Auxerre, the bead of FIG. 3 differs from that of FIG. 2, firstly by the fact that the first bead wire 11, which is axially and radially farthest to the inside, is a bead wire of "braided" type which, having a cross-sectional area equal to the area of the section of a bead wire having rectangular wires, means that overall less space is taken up, and secondly by the fact that the complex formed by the axially outer bead wire 12 and the rubber profiled member 73 is replaced by a single filler 73, which accentuates the thinning of the bead and the reduction in weight of the tire. (column 7, lines 56-66)

Auxerre's member 73 is a "filler", and it is "profiled". At first blush, Auxerre's filler 73 of FIG. 3 might appear to anticipate the elastomeric element 246b of the present invention. However, in contrast thereto, the present invention is directed ot a "locked bead" type of tire. As noted in the

specification (page 7, lines 11-16), "to the extent that the turned up ends **122a,122b** of the carcass ply **122** are placed adjacent to the main portion of the carcass ply **120** and there is no filler or apex disposed between the main portion and the turned up portion of the carcass ply. The placement of the turned up ends **122a,122b** of the carcass ply **122** adjacent to the bead cores **124a,124b** and the main portion of the carcass ply **122** without fillers or apex is the distinguishing characteristic of a locked bead type of tire construction."

In FIG. 2, Auxerre shows three bead fillers 71, 72, 73, plus a second bead wire 12. The bead wire 12 is disposed relatively far from the bead wire 11, requiring the filler 73 between the two bead wires. In FIG. 3, the second bead wire is omitted, but the filler 73 remains, in addition to the other two fillers 71, 72.

Independent **Claims** 17 and **23** are amended herewith to clarify that the present invention is directed to a locked bead type of tire construction, a distinguishing characteristic of which is that there is no filler or apex disposed between a main portion and a turned up portion of the carcass ply.

In Auxerre, the element 73 is axially outward of the bead 11. Note the following (quoted above), " ***the first bead wire 11, which is axially and radially farthest to the inside,*** " (i.e., of the second bead wire 12, or of the element 73 FIGURE 3)

The bead regions of the present invention each comprise an inextensible annular bead core in a side-by-side relationship with a coaxial elastomeric torus, the torus placed outwardly adjacent to each bead core relative to the equatorial plane of the tire. (page 3, lines 5-7) This is very clearly illustrated in FIGURE 3. The elastomer element is axially displaced from the bead. Not radially, as is the second element (being used by the Examiner to negate novelty of Applicant's elastomer element) in Auxerre, or in Yasuda (discussed below).

Independent **Claims 17 and 23** are further amended herewith to clarify that the bead core is in a side-by-side relationship with a the elastomeric element.

The importance of the elastomer element, including the fact that it is an elastomer (not a second

bead) and its side-by-side relationship with the bead, is described at page 8, line 30 through page 9, line 21 of the specification.

Dynamic Operation of the Preferred Embodiment Relative to the Prior Art

The preferred embodiment of the present invention provides all the benefits of conventional locked bead construction, as shown in **FIGURE 1**, including improved sidewall flexibility and the minimization of bending induced shear stresses where turned up portions of the carcass ply are placed adjacent to main portions of the carcass ply. In typical tire construction, as shown in FIGURE 1, due to the compression effect when the tire is deflected, harmful shear stress often occur where the turned up ends **122a,122b** of the carcass structure **120** extends radially outward of the bead cores **124a,124b**, respectively, as the load on the tire **110** tends to pull the main portion of the carcass ply **122** radially outward while the turned up end portions **122a,122b** of the carcass **122** is pulled radially inward. These stresses are concentrated in the turned up ends **122a,122b** of the carcass structure **120** which are constrained by the surrounding elastomeric material and with the assistance of clamping members **126a,126b** as described herein for prior art locked bead tires. The present invention addresses this issue by providing locked end sections **250a,250b** of the turnup ends **242a,242b** of the carcass ply **242** radially inward of the bead cores **244a,244b**, respectively, so that they are constrained between the bead cores **244a,244b** and the turnup ends **242a,242b** and the main portion of the carcass ply **242**. This implies that the carcass ply **242** remains on tension when the tire is inflated or inflated and loaded. In addition, the elastomeric torus **246a,246b** performs a stress relief function that prevents concentrations of stress in the carcass ply **242**. Stresses in the cords of the carcass ply will cause the elastomeric torus **246a,246b** to deform reducing the stress on the carcass ply cords and facilitating the distribution of stress between adjacent ply cords. In comparison, locked bead designs where the carcass ply is anchored directly to an inextensible bead core will see higher concentrations of stress at the interface between the ply cords and the bead core.

In **Claim 24**, the elastomeric elements have a circular cross section.
See also newly-presented **claim 33**. This is not shown in the prior art. Auxerre, for example, teaches away from a circular cross section.

Claim 25 is directed to a construction where the elastomeric elements are in the form of toruses, and each has a cross-section selected from the group consisting of square, oblong, triangular, and octagonal. Auxerre's bead filler 73 does not have this range of design choices.

Claims 28-32 are directed to the "geometry" of the turnup and how it wraps around the bead core and the elastomeric element

3. Claims 23-25 and 28-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasuda (JP 2-293207). As best depicted in Figure 1, Yasuda is directed to a pneumatic tire construction having a tread 12, two bead regions 16, two bead cores 24, a reinforcing ply 18, and two elastomeric elements (one in each sidewall) 30, wherein the turnup 20 of said reinforcing ply wraps around the bead core.

Yasuda Fig. 1 shows an (elastomeric) element 30 looking like a filler, much the same as Auxerre's filler 73.

Yasuda also clearly shows a filler 34 of the type which disqualifies Yasuda's tire as being a locked bead type of tire construction, a distinguishing characteristic of which is that there is no filler or apex disposed between a main portion and a turned up portion of the carcass ply. See **claims 17 and 23**, as amended herewith.

5. Claims 18 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre.
These claims are directed to the elastomeric elements are made of pre-cured rubber.

Although Auxerre's filler 73 is described as a "rubber" filler, it does not disclose or suggest the present invention, for the reasons stated above.

6. Claims 19 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre and further in view of Causa (US 5,513,683).
These claims are directed to the elastomeric elements are reinforced by fibers of materials including glass, Aramid, steel or polyester

Causa is directed to tires made using elastomers containing springy fibers. Springy fibers, when used as a fiber reinforcement in an elastomer, have been found to demonstrate reduced crack propagation in the elastomer. Springy fiber reinforced elastomers can be used in tires in various components. As noted in Causa, a composite rubber composition for a pneumatic tire comprising a reinforced vulcanizable composition is provided. The composition comprises a vulcanizable elastomeric matrix material having dispersed therein an effective reinforcing amount of springy fibers. ***The springy fibers can be from about 100 to 12,000 μm long,*** have a diameter of about 1.2 μm to 1,250 μm, have an aspect ratio of about 25 to 1000, and comprise about 1 to 10 phr (parts by weight per 100 parts by weight of the vulcanizable elastomeric matrix material). The springy fibers may comprise a polymer selected from the group consisting of nylon, polyester and polyolefin, and mixtures thereof. (column 2, lines 40-51; ***emphasis added***)

Since there is no teaching in either Auxerre or Causa of an elastomeric element of the type described and claimed in the present invention, for the locked bead type of tire claimed (as amended), these references do not suggest the features of these claims.

9. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda.
Claim 26 is directed to the elastomeric elements are made of pre-cured rubber, and is discussed above.

10. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda and further in view of Causa.
Claim 27 is directed to the elastomeric elements are reinforced by fibers of materials including glass, Aramid, steel or polyester, and is discussed above.

The Method claims

FIGURES 4A, 4B and **4C**, illustrate several steps in the process of forming the bead regions **238a, 238b** using a substantially conventional tire building drum. See page 9, line 23 through page 10, line 17.

7. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre and further in view of Travers (US 3,301 ,303).

Travers discloses (paragraph at end of column 2):
In manufacturing a tire including two bead cables, the carcass ply or plies are laid on a tire-making drum with the bead 8 also encircling the drum and overlying the outer edge portion of the ply inwardly of its edge 10. The free edge 10 of the ply 9 is then folded inwardly over the bead cable 8 and the bead cable 7 is then lifted over and disposed inwardly of the cable 8 and on top of the inwardly folded portion of the ply or plies. In this way, the plies are wrapped almost completely around the cable 8 and both layers of each ply pass underneath and around the cable 7 when the tire is molded and vulcanized as shown in FIGURE 1.

According to the present invention (paragraph starting at end of page 9):

Referring to **FIGURES 4A,4B**and **4C**, several steps in the process of forming the bead regions **238a,238b** using a substantially conventional tire building drum are illustrated. Only the formation of bead region **238b** is described, since both regions are formed in the same manner. **FIGURE 4A** illustrates the initial step in process of building the tire **230** according to the present invention wherein the carcass ply **242** is placed on the tire building drum **452** followed by the addition of the elastomeric torus **246b** above a groove **454b** formed in a section **452b**. At rest, the inside diameter of the elastomeric torus 246b should preferably be slightly smaller than the diameter of the drum 452 at the bottom of the groove **454b** during the initial building step. The elastomeric torus **246b** may be held in place within groove **454b** in section **452b** of the drum by pressing the elastomeric torus into groove **454b** by any conventional means. As illustrated by **FIGURE 4B**, the turnup end **242b** of the carcass ply **242** is then folded back over the elastomeric torus **246b** toward the center section **452c** of the drum **452** and the bead core **244b** is placed upon the locked or anchored end section **250b** inwardly of and adjacent to the now enfolded torus **246b** relative to the center portion **452c** of building drim **452**. Referring to **FIGURE 4C**, the center portion **452c** of the drum **452** is expanded prior to the addition of the chafer **248b** to prevent movement of the bead core **244b** when the carcass **242** is inflated and the manufacture of the tire **230** is completed by conventional tire building processes well

known to those familiar with the art.

In a manner similar to claims 17 and 23 (discussed hereinabove), claim 20 is amended to clarify that the tire has a locked bead type of construction, a distinguishing characteristic of which is that there is no filler or apex disposed between a main portion and a turned up portion of the carcass ply

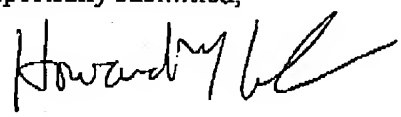
8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Auxerre and Travers as applied in claim 20 above and further in view of Winstanley (US 3,654,007). For the reasons set forth above, claim 21 should be allowable.

Conclusion

The various objections and/or rejections have been traversed. No new matter is entered by this amendment.

Favorable re-examination and reconsideration are respectfully requested along with early allowance of the claims. If any matters remain to be discussed, Examiner is invited to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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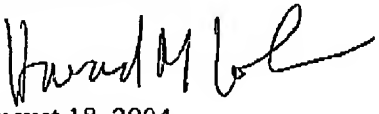
Signature : 

Date of Person signing : August 18, 2004

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